

To:	Andrea Tull, Sound Transit
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CC:	
Date:	February 22, 2021
Re:	Bus Base North Operations on Subarea Off-Peak Hours

Purpose

As noted in the *Final Draft Transportation Technical Report - Bus Base North (TTR)*, peak bus volumes and operations will not occur during the traditional subarea background peak traffic hours. Primarily due to this, the TTR concluded that minimal adverse impact would occur from the Project during peak background traffic periods.

This memorandum documents the results of additional analysis to assess potential traffic impacts during times that represent peak bus volumes generated by the BBN but are outside of the traditional subarea background peak traffic hours. This analysis focuses particularly on queuing related impacts and assesses the 2042 Project-generated peak bus flows, including the BBN bus vehicle peak outbound hours from 5:30 a.m. to 6:30 a.m. and 1:30 p.m. to 2:30 p.m., as well as the Project peak inbound flow hour of 1:30 p.m. to 2:30 p.m. This analysis focuses on the SR 527/214th Street SE intersection and on the BBN driveway intersection with 20th Avenue SE. It assumes that all regular bus ingress/egress to BBN would be exclusively along this route and not south through the business park. This routing is shown in **Figure 1** below.



Figure 1 Bus Base North Routing

Methodology

Peak subarea turning movement counts which were collected for the TTR traffic analysis, were adjusted from peak hours to off-peak hours using 24-hour traffic count data collected on SR 527 south of 208th Street SE in both 2020 and 2016. Adjustment factors from this comparison are summarized below.

- **5:30 a.m.** (derived from 7:45 a.m. turning movement counts)
 - Northbound SR 527 and vehicles turning right from 214th Street SE (northbound) – 0.34
 - Southbound SR 527 and vehicles turning left from 214th Street SE (southbound) – 0.71
- **1:30 p.m.** (derived from 4:30 p.m. turning movement counts)
 - Northbound SR 527 and vehicles turning right from 214th Street SE (northbound) – 1.08
 - Southbound SR 527 and vehicles turning left from 214th Street SE (southbound) – 1.11
- **2:30 p.m.** (derived from 4:30 p.m. turning movement counts)
 - Northbound SR 527 and vehicles turning right from 214th Street SE (northbound) – 1.09
 - Southbound SR 527 and vehicles turning left from 214th Street SE (southbound) – 1.05

Based on information received from the Northshore School District (NSD), an additional 62 outbound buses (37 traveling southbound on SR 527, and 25 northbound) from the adjacent NSD school bus base were added to the 5:30 a.m. analysis hour, and 62 inbound buses added to the 1:30 p.m. analysis hour.

Trip generation from Bus Base North as documented in the TTR includes the following:

- **5:30 a.m.** – 38 outbound buses and 40 inbound private vehicles
- **1:30 p.m.** – 48 inbound buses and 5 inbound private vehicles (12:30 p.m. BBN trip generation was used for the purposes of worst-case scenario/maximum interaction with Northshore School District Buses)

Traffic Analysis Results

2042 traffic analysis results at the SR 527/214th Street SE intersection shows no more than five seconds of additional delay and minimal change in overall intersection level-of-service (LOS) during any of the three peak bus hours as shown in **Table 1**. Note: signal timing was not optimized and remains unchanged from peak period analysis.

Table 1 Intersection level-of-service, Off-Peak Hours No Build vs. Build

2042 SR 527/214th Street SE				
	No Build		Build	
Hour Starting	Avg Veh Delay	LOS	Avg Veh Delay	LOS
5:30 AM	17	B	22	C
1:30 PM	73	E	78	E
2:30 PM	76	E	77	E

Additionally, in all Build time frames analyzed, queues from bus traffic fit within the existing roadway storage at SR 527/214th Street SE as shown in **Table 2** and **Table 3**. The intersection configuration is shown in **Figure 2** below. The westbound left turn bay on 214th Street SE approaching SR 527 has about 280 feet of storage capacity before it would start to block eastbound left turns into a driveway on the north side of the roadway. However, in the morning the 95th percentile queue is only 126 feet, and in the afternoon (2:30 p.m.) it's 224 feet. In both cases, it's within the storage capacity of the left turn lane and does not result in blocking the driveway. Similarly, the impact to the northbound right turn movement from SR 527 to 214th Street SE is expected to be negligible. There is not a dedicated right turn lane for that movement, but there is a 'free right' turn slip lane and the 95th percentile queue is projected to average less than 45 feet during the periods of peak bus flows, which would not impact traffic flows on SR 527.



Figure 2 SR 527 & 214th Street SE Existing Configuration

Table 2 Outbound bus movement queues at SR 527/214th Street SE

SR 527/214th St SE Westbound Left (outbound from BBN)			
Hour Starting	50th Percentile (ft)	95th Percentile (ft)	Storage Capacity (ft)
5:30 AM	70	125	280
2:30 PM	145	225	280

Table 3 Inbound bus movement queues at SR 527/214th Street SE

SR 527/214th St SE Northbound Right (inbound BBN)			
Hour Starting	50th Percentile (ft)	95th Percentile (ft)	Storage Capacity (ft)
1:30 PM	25	45	NA

Due to the overall low level of background traffic volumes during the peak BBN bus flow periods, inbound queues at the BBN driveway are projected to be minimal as shown in **Table 4** and would fit within the proposed left turn lane into the base, hence not adversely impacting through traffic on 20th Avenue SE.

Table 4 Inbound bus movement queues at BBN driveway

20th Ave SE/BBN Driveway Southbound Left (inbound BBN)			
Hour Starting	50th Percentile (ft)	95th Percentile (ft)	Storage Capacity (ft)
1:30 PM	0	15	325